

***Afrocamilla stuckenbergi*, a new African genus and species of
Camillidae (Diptera), with comments on its behaviour and biology**

by

D. A. Barraclough

(Natal Museum, P. B. 9070, Pietermaritzburg, South Africa)

ABSTRACT

The systematics of the Camillidae is reviewed; this small family of acalyptrate Diptera now includes 4 genera and 15 named species in the Afrotropical and Palaearctic Regions. The Afrotropical fauna (currently three named species) is characterised. *Camilla africana* Bezzi, 1908 is transferred from the Camillidae to the Drosophilidae. A key to the four world genera of Camillidae is presented. *Afrocamilla* gen. n. is described to accommodate *Camilla armata* Hackman, 1960 and *A. stuckenbergi* sp. n., both from South Africa. *A. stuckenbergi* is described as new. External and postabdominal characters of both sexes are discussed, particularly the modification of abdominal terga 2 and 3, development of elongate marginal bristles on tergum 2 and the form of the ventral receptacle in the female.

Behavioural observations on a population of *Afrocamilla stuckenbergi* at Jackson's Falls in the Assagay/Shongweni area of Natal, have shown that adults there were restricted to faecal pellets in a latrine of the rock hyrax *Procavia capensis* (Pallas). Adults were laboratory reared from a sample of this dung. Copulation is described, as are characteristic abdominal and wing movement. The upward flexure of the elongate bristles on tergum 2 beneath the surface of the folded wings, produces a striking up-and-down wing movement which probably has a signalling function.

INTRODUCTION

The Camillidae is a small family of acalyptrate Diptera, which in a recent study of the phylogeny and classification of the Muscomorpha (McAlpine 1989) was placed in the superfamily Ephydroidea (Drosophiloidea). The Ephydroidea are well characterised by McAlpine, who listed nine autapomorphic character states for his concept of the superfamily. This grouping includes only five families, namely Curtonotidae, Camillidae, Drosophilidae, Diastatidae and Ephydridae. Although the Camillidae are not of any economic significance, in recent years the family has received notable attention in academic literature. Hennig (1971) and Griffiths (1972) first suggested that the Camillidae are the sister group to the Drosophilidae, based on the presence of a dorsolateral process projecting from the base of the third antennal segment into the second segment (a synapomorphy). McAlpine (1989) supported this tenet, whereas Grimaldi (1990) suggested that the Camillidae are most closely related to the Ephydridae, based mainly on a PAUP analysis of the character states of ephydroid families presented by Griffiths (1972) and Chandler (1987). I believe that the true relationships of the Camillidae will only be established with further study of postabdominal structures of both sexes, and after the immature stages have been described for representative species.

Very little published information about the biology of camillids exists, this

being inconclusive and based on European species of *Camilla* (see Ferrar 1987: 98). Basden (1961) recorded four species as breeding in soil at the entrance to rabbit burrows in Britain; a puparium of one of these species (*C. atrimana* Strobl, 1910) was also found in the subterranean nest of a small rodent. *Camilla glabra* (Fallén, 1823), the most widely distributed species of *Camilla*, has been reared from mouse nests in Britain (Collin 1956). Cogan (1980) reported that species of *Camilla* are associated with birds' nests and droppings.

The southern African Camillidae have, prior to this study, been very poorly known (each of the two species based on an unique holotype), so it is of some value to characterise the family to aid future recognition of these small flies. Adults are 2.0–3.3 mm long and have the following combination of character states (significant diagnostic character states of other ephydroid families in parentheses): costa broken just beyond humeral crossvein and proximally to its junction with R_1 ; subcosta much reduced, apically evanescent and not reaching costa (subcosta complete in Curtonotidae); no basal crossvein; anal cell rudimentary, apically open, anal vein absent; postocellar bristles convergent (bristles in postocellar region absent or divergent in Ephydriidae); vibrissae present; nearly always two reclinate orbital bristles, anterior bristle minute and barely evident; proclinate orbital bristle, when present, arises medial to reclinate bristles (lateral to reclinate bristles in Diastatidae); mesopleuron with bristles (absent in Drosophilidae and some Diastatidae).

MATERIALS AND METHODS

This study was based on the examination of pinned adult Camillidae and Drosophilidae from the following depositories:

Hungarian Natural History Museum, Budapest, Hungary (HNHM)
Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium (ISNB)
Museum of Zoology, Lund University, Sweden (MZLU)
Natal Museum, Pietermaritzburg, South Africa (NMSA)
Zoological Museum, Tel Aviv University, Israel (TAUI)

Morphological terminology mainly follows that of Papp (1984 1985). Bilaterally symmetrical structures are described in the singular. Holotype label data are quoted exactly as they appear, sometimes with supplementary information in square parentheses; a slash (/) denotes the end of a line of print and a semicolon separates data quoted on different labels. Holotype measurements are given in parentheses following the range for other specimens examined. Body length comprises the sum of two measurements, namely (a) from the anterior surface of the antenna to the posterior margin of tergum 2, and (b) from the anterior margin of tergum 3 to the abdominal apex. Wing length was measured from the humeral crossvein to the wing-tip. All illustrations were drawn personally with the aid of a Wild M5 stereomicroscope and drawing-tube; only the outline shapes of the epandrium, surstylus, epiphallus and postgonite are presented as surface vestiture is not taxonomically significant.

It was often extremely difficult to sex specimens of *Afrocamilla* with the terminalia *in situ*. Thus although the sex of the holotype is given and representative males from both localities were dissected, the total number of

paratypes only is cited under 'Material examined'. The sex of dissected specimens is noted on the paratype or identification labels concerned.

Nearly all specimens were dry-mounted with minuten pins onto *Polyporus* strips. The abdomen was detached at the base of tergum 3 by pushing upwards beneath the abdominal apex with the tip of a pin. It was then cleared in hot KOH, so that the terminalia could be dissected free and examined/illustrated in glycerine. The entire abdomen and dissected terminalia were stored in glycerine in a microvial pinned beneath each specimen.

SYNOPSIS OF THE WORLD FAUNA OF CAMILLIDAE

The Camillidae is an Old World family which is widespread in temperate and tropical parts of the Palaearctic and Afrotropical Regions. *Camilla glabra* was recorded from Canada by McAlpine (1960), but is almost certainly an introduction there. The Palaearctic fauna comprises the European Baltic amber genus *Protocamilla* Hennig, 1965 (one species) and 11 named species of *Camilla* Haliday, 1838. *Camilla* seems to be centred on the Mediterranean subregion, but is otherwise widely distributed through Europe into the North and Central European territories of the former U.S.S.R., with two outlying species described from Mongolia.

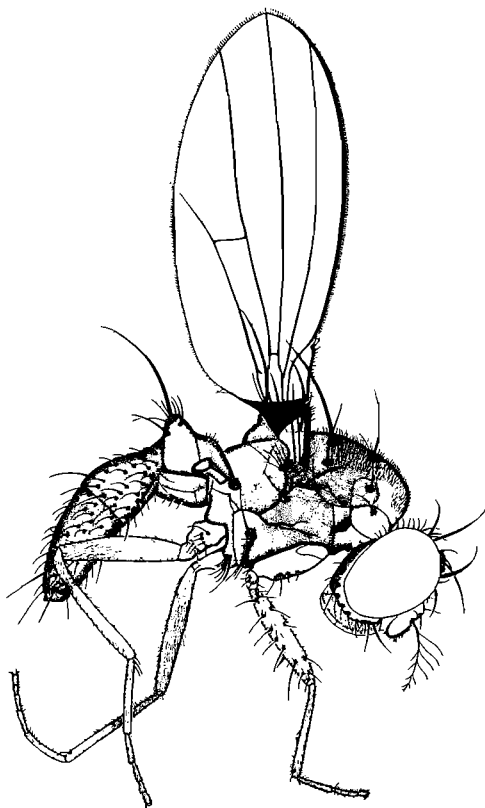


Fig. 1. *Afrocamilla stuckenbergi* sp. n., habitus of adult female.

Katacamilla Papp, 1978 (one species described from Namibia) and *Afrocamilla* gen. n. (two named species from South Africa) are the only species currently recorded from the Afrotropical Region. *Camilla* is likely to have Afrotropical representatives, although there are few, if any, published records. According to Cogan (1980), the Mediterranean species *Camilla acutipennis* (Loew, 1865) occurs in Kenya, but this record should be treated with caution; this was similarly suggested by Papp (1985). Both Hackman (1960) and Cogan (1980) treated *Camilla africana* Bezzi, 1908 from Kinchassa [sic], Zaïre as a camillid, but Papp (1985) considered that it did not belong in the Camillidae. I have recently examined the syntype series (in poor condition) of *C. africana* from ISNB and can confirm that although it belongs in the Ephydroidea, it should be excluded from the Camillidae. The facial carina, ommatrichia on the compound eyes, complete anal cell and bare mesopleuron confirm that it belongs in the Drosophilidae and I hereby transfer it to this family.

Key to world genera of Camillidae

- 1 Arista virtually bare or pubescent. 1 strong dc. Disc of scutellum covered with short vestiture. Pteropleural bristle present. Fore femur without spine on anterior surface **Katacamilla** Papp, 1978
- Arista short- to long-plumose. 2 strong dc. Disc of scutellum bare. Pteropleural bristle absent. Fore femur usually with anterior spine 2
- 2 Arista short-plumose. Mesopleuron with irregularly scattered bristles. Fore and hind tibiae with dorsal pre-apical bristle. Fore tarsus form and vestiture sexually dimorphic; basitarsus about half length of second segment and basal 3 segments with long hairs in male, female basitarsus noticeably longer than second segment and basal 3 segments without noticeable vestiture [European Baltic amber] **Protocamilla** Hennig, 1965
- Arista always long-plumose above. Mesopleuron with several distinct bristles along hind margin only. Fore and hind tibiae without dorsal pre-apical bristle. Fore tarsus form and vestiture not sexually dimorphic; relative lengths and vestiture of basal 3 segments similar in both sexes 3
- 3 Basal section of wing with dark transverse fascia at level of humeral crossvein. One sternopleural bristle. Abdomen with strikingly elongate paired bristles on posterior margin of tergum 2, these much longer than other tergal bristles (Fig. 1); tergum 2 exserted well above level of terga 3–4, base of tergum 3 deeply excavate and invaginated beneath posterior margin of tergum 2 (Figs 1 & 3) **Afrocamilla** gen. n.
- Wing membrane without markings, never with dark basal transverse fascia. Nearly always two sternopleural bristles. Abdomen without any elongate bristles on posterior margin of tergum 2, all bristles short and inconspicuous; tergum 2 not exserted above level of terga 3–4 and base of tergum 3 not deeply excavate (Fig. 2) **Camilla** Haliday, 1838

TAXONOMY

Afrocamilla gen. n.

Type species: *Afrocamilla stuckenbergi* sp. n., by present designation.

Etymology: Refers to the African provenance of the genus. Gender feminine.

Description (based on both sexes):

Head: Proclinate orbital bristle well developed, half to two-thirds length of posterior reclinate orbital. Arista long-plumose dorsally, longest ray subequal to or slightly longer than third antennal segment. Two well developed vibrissae, these noticeably longer and stronger than adjacent peristomal bristles.

Thorax: Propleuron usually with very weak bristle on lower margin. Prostigmatic bristle absent. Mesopleuron with a few minute hairs near posterior margin; always 2 distinct bristles on posterior margin, reclinate lower bristle about 2–4 times length and strength of anterodorsally directed upper bristle. One strong, upwardly directed sternopleural bristle (Fig. 1). Pteropleural bristle absent. One supra-alar bristle. One or two postalars, medial bristle greatly reduced or sometimes absent. Dorsocentrals well developed, anterior bristle about half to two-thirds length and strength of posterior bristle. Scutellum with 2 pairs marginal bristles, but lacking other vestiture.

Legs: Fore femur with strong anteroventral spine. Fore tarsus form and vestiture not sexually dimorphic, basitarsus about twice length of second tarsal segment in both sexes. Tibiae all without dorsal preapical bristle (Fig. 1).

Wing: Dark transverse fascia at level of humeral crossvein (Fig. 71). Basal crossvein barely developed, reaching at most about half distance between cubital and medial sectors.

Abdomen: Terga 2–3 modified; tergum 2 bulbous and exserted well above level of terga 3–4 (Fig. 1); tergum 3 deeply excavate and invaginated beneath posterior margin of tergum 2 (Fig. 3). Tergum 2 with pair of strikingly elongate bristles on posterior margin, these subequal to or slightly longer than subapical scutellar marginals (Fig. 1).

Postabdomen: Tergum 5 unmodified, usually not or at most moderately exposed in dorsal view, *in situ* length much less than that of tergum 4. Male: Tergum 6 unmodified, usually completely divided into 2 laterally positioned elongate-ovoid sclerites; cerci well developed, not fused; aedeagus slender. Female: spermathecae not visible, ventral receptacle present, well developed and strongly sclerotised (Fig. 13).

Discussion: Prior to this work, species now included in *Afrocamilla* were known only from the male holotype of *A. armata* (Hackman) in poor condition (Hout Bay, South Africa) and possibly from a single female (Koka, Ethiopia) identified as *armata* by Papp (1985). Although both Hackman (1960) and Papp (1985) referred to some of the unusual character states of these specimens, both authors included them in the Palaearctic genus *Camilla*. An intensive study of the male holotype of *armata* and a long series of a similar new species (*A. stuckenbergi*, see description below) from two localities in Natal, South Africa, has however

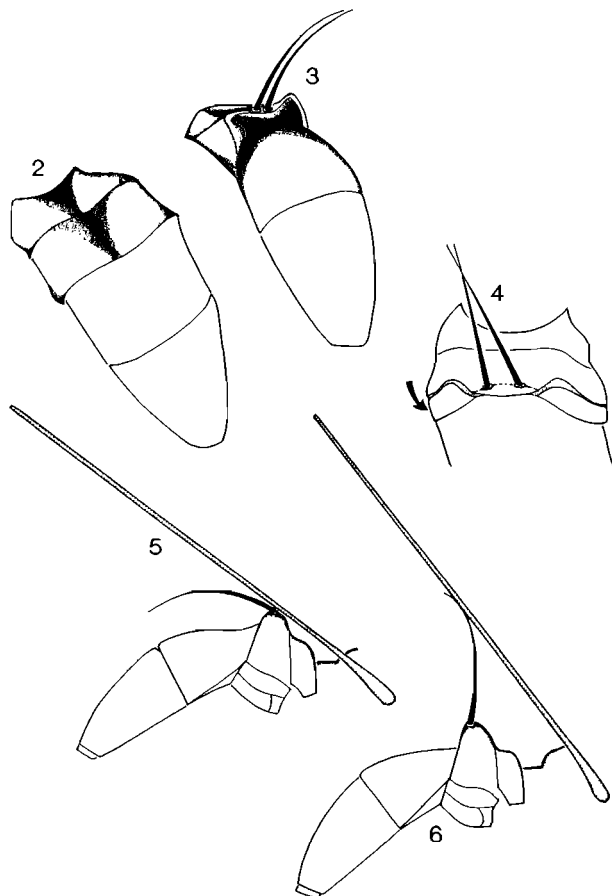
conclusively shown that these species do not belong in *Camilla*, and are also excluded from *Katacamilla* and *Protocamilla*. *Afrocamilla* gen. n. has accordingly been described to accommodate them.

Katacamilla (Namibia) is disjunct from other extant genera of Camillidae (refer to character states cited in generic key) and there is little doubt that it is a monophyletic segregate. Of particular significance are the presence of a pteropleural bristle, development of vestiture on the disc of the scutellum and reduction in the anterior of the two dorsocentrals (all character states which do not otherwise occur in the family). The affinities of the Oligocene genus *Protocamilla* are uncertain, but it appears to be closer to *Camilla* and *Afrocamilla* than *Katacamilla*; it is readily distinguished from the former two genera by the short-plumose arista and dorsal pre-apical bristle on the fore, mid and hind tibiae.

Afrocamilla is distinguished from all described species of *Camilla* by lacking a dorsal pre-apical bristle on the mid tibia (see eg. Papp 1984). Papp (1984) also stated that Palearctic species of Camillidae (ie. *Camilla*) have two sternopleural bristles, this distinguishing them from *Afrocamilla* with one. However, I have seen specimens of *C. acutipennis* with only one sternopleural, and this was referred to later by Papp (1985: 217). Although *C. armata* was included in Papp's (1985) key to the world species of *Camilla*, these distinctions were not noted. Both Hackman (1960) and Papp (1985) treated the basal wing fascia and pair of very long marginal bristles on tergum 2 as unique character states within *Camilla*, but I now consider these (and the modification of terga 2-3) to be likely autapomorphies defining *Afrocamilla*. *Camilla* species always lack wing markings (Papp 1984). The development of elongate bristles on tergum 2 is particularly significant as this correlates with an unusual modification of terga 2-3. I have not examined all species of *Camilla*, but I can find no reference in the literature to any modification of these terga. *Afrocamilla* consistently has (in both live and pinned material) tergum 2 bulbously exerted well above the level of all posterior terga, with the elongate bristles inserted on the posterior margin of tergum 2 (Figs 1 & 3). Tergum 3 is deeply excavate basally, here invaginated directly beneath the insertions of the elongate bristles (Fig. 3). The anterolateral margins of tergum 3 are, in addition, reduced to elongate-ovoid tergites separated by membrane from the anteromedial margin (Fig. 4). It appears that these small tergites fold or buckle inwards, so producing the excavate flexure.

The unusual modification of terga 2-3 probably allows for appropriate muscle insertion and flexure in this region, producing the very marked up-and-down movement of the elongate marginal bristles on tergum 2 in living specimens of *Afrocamilla*. This movement (see discussion of behaviour and biology) has a functional and probably a behavioural significance, as the bristles can be arched almost directly upwards to splay beneath the surface of the folded wings, so causing them to move up-and-down as well (see Figs 5 & 6). This unusual behavioural trait is unlikely to occur in species of *Camilla*, as the bristles on tergum 2 are not similarly developed and so would not make contact with the wings. This latter distinction between *Afrocamilla* and *Camilla* needs to be verified. It would provide additional behavioural evidence to support the morphological basis for the generic concepts.

Postabdominal character states of both sexes of *Afrocamilla stuckenbergi* and of



Figs 2-6. Abdominal structures in Camillidae. 2-3. Laterodorsal view of abdomen (short marginal and other tergal vestiture omitted). 2. *Camilla acutipennis* (Loew). 3. *Afrocamilla stuckenbergi* sp. n. 4-6. *Afrocamilla stuckenbergi* sp. n. 4. Dorsal view of abdominal base cleared in KOH, showing small anterolateral tergites (one arrowed) differentiated from tergum 3. 5-6. Profile sketches showing movement of elongate bristle on second tergum and folded wings. 5. Tergum 2 bristle directed backwards parallel to abdominal surface, folded wings in resting position. 6. Tergum 2 bristle directed vertically upwards, pressing beneath folded wings and forcing them upwards.

the male of *A. armata* agree well with those of *Camilla* and with the autapomorphies cited for the Camillidae by McAlpine (1989). Thus spiracles 5 and 6 are enclosed in the tergal margins (male), spiracle 7 is absent (both sexes), tergum 5 and sternum 6 are greatly reduced and sternum 7 absent (male), and the female terminalia are extensively membranised. I have dissected several females of *Afrocamilla*, but have not been able to detect spermathecae, although the ventral receptacle is well developed and sclerotised (Fig. 13). Camillidae supposedly have two spermathecae (see eg. Papp 1982 1984), but this would be for *Camilla* species only (females of *Katacamilla* and *Protocamilla* have not been dissected). McAlpine (1989: 1491), in his discussion of the monophyly of the Diastatidae, stated that the function of the

spermathecae can be supplemented and apparently replaced by the ventral receptacle. The apparent loss of the spermathecae (or at least loss of sclerotisation) and the presence of a sclerotised ventral receptacle are significant features, as these character states were cited by McAlpine in the same work (p. 1491) as autapomorphies defining the Ephydriidae. The development of the spermathecae and ventral receptacle need to be reviewed for representative species of all camillid genera, together with postabdominal characters in general, so that the relationship between the Ephydriidae and Camillidae can be properly assessed.

Afrocamilla armata (Hackman, 1960) **comb. n.**

Figs 7–9

Camilla armata Hackman, 1960: 381; Cogan, 1980: 654; Papp, 1985: 218.

Holotype ♂: SOUTH AFRICA: Cape Province: 'S Afr Cape Prov / Cape Peninsula, Hout / Bay Skoorsteenkop. / 2.II.51 No. 166'; 'Swedish South Africa / Expedition / 1950–1951 / Brinck – Rudebeck'; 'Insect trap / Alt ft'; 'Camilla / armata / Hackm. / Holotypus' [Rectangular red card; 'Holotypus' printed with black border]; 'Zool.Mus.Lund Sweden / Type No. 40:1 / Camillidae'. In MZLU. In poor condition, left wing apically tattered, frons and thoracic pleura partially rubbed and mesonotum badly torn by pin (abdomen dissected free, stored with cleared postabdomen in glycerine-filled microvial beneath specimen).

Discussion: I have not formally redescribed this species, given the poor condition of the holotype, which is probably the only known specimen. Papp (1985) identified a single female from Koka (Ethiopia) as *armata*, but it is unlikely to be this species.

Afrocamilla armata is distinguished from *A. stuckenbergi* (see diagnosis, below) as follows: frons with only anterior margin pale; face and parafacials entirely dark brown; epandrium slender in profile (Fig. 7), depth about two-thirds surstylus length; postgonite and epiphallus finger-like along entire length in profile, epiphallus broadly rounded apically and not broader basally (Fig. 9); surstylus profile as in Fig. 8. The third antennal segment and anterior mesonotal margin appear darker than in *A. stuckenbergi*, but this can only be verified following the examination of further specimens.

Afrocamilla stuckenbergi sp. n.

Figs 1, 3, 4, 10–13

Etymology: Named for Dr Brian Stuckenberg, in recognition of his interest in the southern African Camillidae.

Diagnosis: Frons pale on anterior half to two-thirds; face and parafacial always partly yellow; epandrium robust in profile (Fig. 10), depth subequal to surstylus length; postgonite and epiphallus broad basally and sharply tapered apically in profile (Fig. 12); surstylus profile as in Fig. 11.

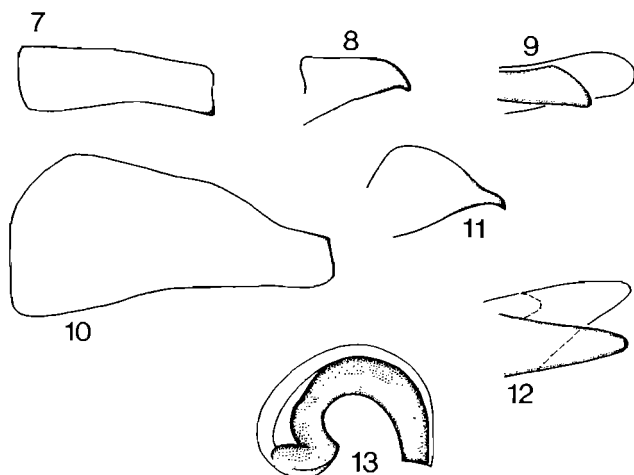
Holotype ♂: SOUTH AFRICA: Natal Province: 'S AFRICA: Natal #45 / Mhlatuzana [River] (18.xii.'90 / 29°48'S:30°45'E 500m / Reared out: 18.1.1991 /

Coll: A.E. Whittington / from Hyrax Faeces'; 'HOLOTYPE ♂ / *Afrocamilla stuckenbergi* / BARRACLOUGH' [Rectangular card, red perimeter]. In NMSA (Type No. 508). In good condition.

Description (based on both sexes):

Dimensions: Body length 2,3–3,3 (2,6) mm; wing length 1,9–2,8 (2,2) mm.

Colour/Pollinosity: Head with bicoloured frons, yellow to orange on anterior half to two-thirds and dark brown to black posteriorly; occiput dark, although generally paler ventrally; cheek and lower half of postorbit yellow; antenna mostly yellow-orange to pale brown, but arista dark, second segment sometimes partly dark dorsally and third segment sometimes dark along dorsal margin; face, parafacial and epistome yellow (lower and medial section of face sometimes pale brown); palpus yellow to pale brown; pollinosity present only on occiput (silver to pale brown) and on cheek, epistome and parafacial (silver to yellow). Thorax predominantly glossy, very dark brown to black, but anterior section of humeral callus and anterior pleural and (usually) mesonotal margins tinged with yellow to dark orange (if visible, pale ground colour vaguely differentiated on mesonotum into paired medial and lateral vittae extending to lateral transverse sutures and just beyond respectively); scutellum often with pale posterior margin just visible beneath pollinosity [careful rotation required]; mesonotum often with faint blue/green metallic reflections; pollinosity distributed as follows: densely along entire posterior margin of sternopleuron and more sparsely on hypopleuron (silver), irregularly on and between posterior section of pleurotergite, entire mediotergite and scutellum (silver to brown). Ground colour of legs pale (yellow to very pale brown), although apical tarsal segment usually darker brown; fore



Figs 7–13. Postabdominal structures in *Afrocamilla*. 7–9. *Afrocamilla armata* (Hackman). 7. Epandrium, profile. 8. Surstylus, profile. 9. Aedeagal epiphallus and right postgonite (stippled perimeter). 10–13. *Afrocamilla stuckenbergi* sp. n. 10. Epandrium, profile. 11. Surstylus, profile. 12. Aedeagal epiphallus and right postgonite (stippled perimeter). 13. Ventral receptacle. [All to same scale.]

femur sometimes brown-tinged dorso-apically; mid leg with apical half to two-thirds of femur and basal half to two-thirds of tibia brown to dark brown; hind leg with apical half to two-thirds of femur and basal third of tibia brown to dark brown (femur and tibia rarely mostly pale). Wing membrane very pale brown infuscated; veins yellow to pale brown; transverse basal fascia narrow anteriorly, usually expanding to twice this width at posterior margin. Abdominal terga strikingly glossy (particularly in live specimens) with violet/blue reflections; terga 1–2 brown pollinose.

Head: Eye margin gently curved anterodorsally in profile. Facial region relatively narrow in frontal view, width of face and parafacials at mid-height about $0,8\text{--}1,2 \times$ length of antenna. Antenna with short rays along ventral one- to two-thirds of arista, longest dorsal rays reaching $1,2 \times$ length of third antennal segment. Upper orbital plate inconspicuously developed anteriorly, width $0,3\text{--}0,4 \times$ that of ocellar triangle; proclinate orbital bristle present, anterior reclinate bristle visible and about quarter length of proclinate bristle. Cheek depth in profile $0,3\text{--}0,6 \times$ length of third antennal segment.

Thorax: Scutellum with basal marginal bristles weakly developed, reaching about half length and strength of subapical marginals. Fore femur with irregularly developed posterodorsal and posteroventral rows of bristles on basal four-fifths, apical bristle (both dorsally and ventrally) positioned coincident with anteroventral spine and at least twice strength of more basal bristles, bristles of dorsal row usually longer and stronger than those of ventral row. Wing not unusually slender; usually without noticeably differentiated longer ventral spinules on costa between R_1 and R_{2+3} , rarely 5–7 short spinules just visible.

Postabdomen: Tergum 5 not or barely visible dorsally *in situ*. Male: Tergum 6 reduced to relatively squat, unconnected vestiges; epandrium rotund in profile (Fig. 10), depth subequal to surstylus length; aedeagal epiphallus and postgonites relatively closely approximated, both relatively broad basally (dorsobasal section of epiphallus sometimes unsclerotised and upper margin of postgonite very weakly sclerotised) and sharply tapered apically in profile (Fig. 12); surstylus profile as in Fig. 11. Female: Unremarkable, similar to *Camilla glabra* (Fallén) (see McAlpine 1987: 1024); ventral receptacle as in Fig. 13.

Material examined: SOUTH AFRICA: *Natal:* 18 paratypes, Jackson's Falls, Mhlatusana River, $29^{\circ}48'S:30^{\circ}45'E$, 18.xii.1990, 6.i.1991, Barraclough, Indig. Forest, 500 m [collected from hyrax droppings at base of krantz] (NMSA; 1 pair in AMSA); 2 pairs, same data (HNHM; MZLU); 6 paratypes, Mhlatusana [River], $29^{\circ}48'S:30^{\circ}45'E$, 18.xii.1990, A. E. Whittington, 500 m, Reared out: 18.i.1991, from Hyrax Faeces (NMSA); 20 paratypes, Pietermaritzburg, Town Bush, 2.x.1983, A. Freidberg (TAUI); 1 paratype, same data except, 29.x.1971, M. E. Irwin (NMSA); 2 paratypes, same data except, viii.1976, R. Miller (NMSA).

Discussion: There are an additional six specimens collected by Freidberg at Town Bush in TAUI which I have not seen, and which almost certainly belong to *A. stuckenbergi*. It should be noted that populations of *Procavia capensis* occur in

the Town Bush area, where *A. stuckenbergi* has been collected on three separate occasions between 1976 and 1983.

Of interest is that the postgonites are either positioned subparallel to the epiphallus or are splayed outwards on each side (similar to McAlpine 1987, p. 1024 Fig 97.2). It appears that the former condition occurs *in situ* and that the outward displacement results from prolonged clearing in KOH. The broad basal shape of both the epiphallus and postgonites are generally only evident in profile when the postgonites have not been displaced. The upper margin of each postgonite is usually very weakly sclerotised, and it is often necessary to examine it obliquely to see the substantially broader basal region relative to the sharply tapered apex. I have also noticed some insignificant intraspecific variation in the profile shape of the surstylus.

BIOLOGY AND BEHAVIOUR

A population of *Afrocamilla stuckenbergi* was observed on three occasions in December 1990 and January 1991 at an accumulation of faecal pellets of the rock hyrax *Procavia capensis* (Pallas), near Jackson's Falls [29°48'S:30°45'E] on the Mhlathuzana River in the Assagay/Shongweni area of Natal. The hyrax latrine was 1 m long, in a sandy region at the base of a south facing krantz about 50 m from the river. The area was strongly shaded through much of the day, and cool with considerable condensation and runoff on the vertical rock-face above it. The latrine was positioned a few metres from the margin of dense indigenous forest.

Adult camillids were largely confined to the latrine, although isolated specimens were occasionally observed on horizontal and vertical rocky surfaces nearby. The latrine attracted a diverse array of coprophagous Diptera, although there appeared to be no aggressive or territorial interactions between the families. Cyclorrhaphous families included (in order of abundance): Sepsidae, Sphaeroceridae, Camillidae, Drosophilidae and Muscidae. *A. stuckenbergi* could immediately be recognised by its rather hump-backed appearance, constantly folded wings, red eyes and strikingly metallic abdomen. Adults favoured the upper surfaces of pellets. This was in contrast to Sphaeroceridae, for example, which often moved to deep within crevices between adjacent pellets.

Within the latrineal area *A. stuckenbergi* was strongly attracted to moist, fresh faecal pellets, where copulating pairs were most frequently observed. Such pairs moved about *in copulo*, almost always remaining on the pellets. The male clasped the basal terga of the female's abdomen with his legs, and positioned obliquely above her abdomen, directed his postabdomen backwards and slightly downwards to make contact with her genitalia. During copulation the male's wings remained tightly folded, while those of the female were slightly parted. Interaction between males attempting to copulate with the same female was not observed.

The flight of specimens was typically drosophiloid. Motionless hovering above the latrine could be fairly prolonged, lasting 10–20 seconds. Short erratic flights between adjacent piles of pellets sometimes occurred.

Both sexes exhibited characteristic abdominal and wing movement. Whilst

walking on the surface of pellets, the abdomen was moved rhythmically up-and-down such that its apex tapped the substrate. The elongate marginal bristles of tergum 2 were either directed directly backwards parallel to the abdominal surface (Fig. 5) or arched almost vertically upwards to splay beneath, and in contact with, the folded wings (Fig. 6). The upward flexure of the bristles resulted in the very marked up-and-down movement of the folded wings, which occurred intermittently; this was confirmed under magnification in the laboratory. The angle between the abdominal dorsum and the folded wings reached a maximum of about 60°; when elevated to certain angles the wings reflected light quite markedly. Although this still needs to be determined, I suspect that upward wing movement may be part of a signalling repertoire related to mating behaviour. Upward flexure of the marginal bristles and the folded wings seems to be unrelated to downward movement of the abdominal apex.

Oviposition on faecal pellets was not conclusively observed. However, a quantity of pellets was removed from the study site to the laboratory, where adult *A. stuckenbergi* emerged at room temperature. A study of the immature stages of *Afrocamilla* (and of additional adult material) is currently in progress. Further collecting is required to confirm whether the immature stages of southern African Camillidae are restricted to the dung of *Procavia capensis* and other Procaviidae (Hyracoidea). If this is verified, then it may explain the previously rather infrequent collecting of Camillidae in the subregion. *Procavia capensis* is restricted to southern Africa (see Smithers 1983), but occurs only in suitable habitat, namely rocky outcrops and hillsides or piles of loose boulders. Such areas are generally inaccessible, and would often not have been reached by insect collectors.

The range of Procaviidae extends through much of Africa, but also including Sinai, Israel, Syria and Arabia (Walker 1975). It will be interesting to discover whether there is a preference for the dung of Procaviidae in the Middle East (at least eight species of *Camilla* occur here), or whether Camillidae there use the dung of other small mammals, as is likely in western Europe (see Basden 1961).

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